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NASA TECH BRIEF

Preparation of Thin Polymer Films for Infrared Reaction Rate Studies

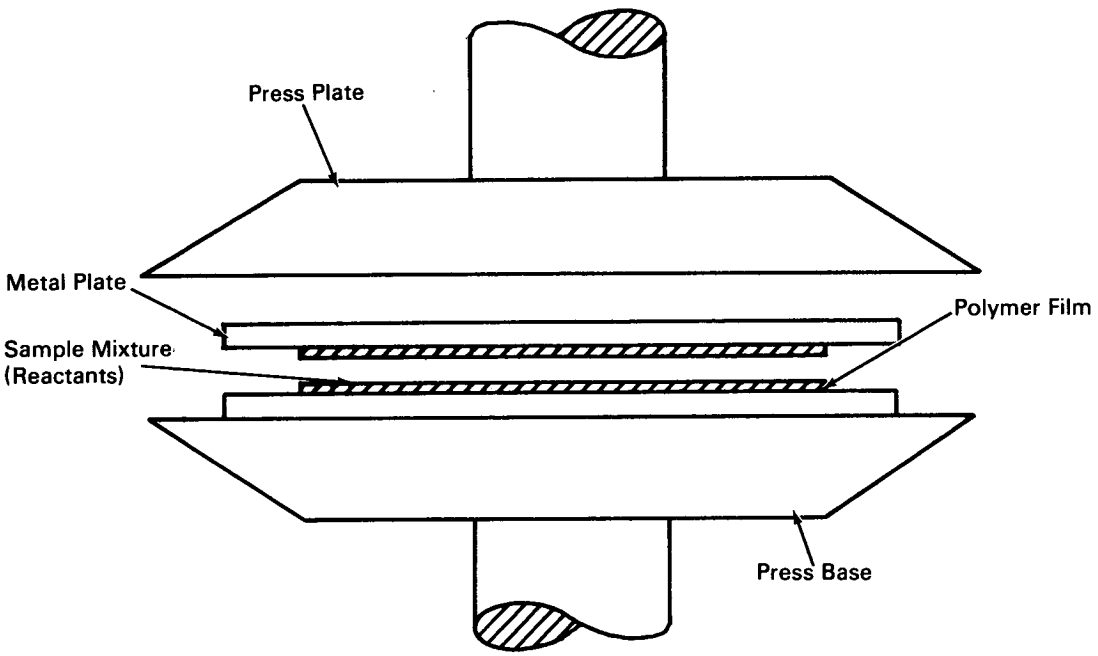

Diagram of Sample Preparation Setup

A method of preparing thin films for studying reaction rates of polymer systems has been developed using infrared spectrophotometric techniques. The preparation procedure is similar to that applied in the formulation of many different composites, and may be modified for most general laboratory analyses where infrared spectrophotometric methods are used.

The procedure involves the pressing of a neat ("as is") mixture of reactants between nonreactive thin polymer films with absorption bands that will not interfere with those being investigated. Prior methods, with the sample being on or between salt plates or in solution, imposed limitations such as too great a film thickness prevented the use of strong absorbers; path length could not be reproduced; and materials in solution were influenced by the concentration. The use of controlled conditions to press viscous liquids between solid films to prepare sample, and "holder", for infrared spectrophotometric analysis appears to be novel.

One example where film thickness is important is in the reaction of isocyanates with polyols. Sample reactants are mixed and placed between two thin polymer films, as shown in the figure. Films should be

(continued overleaf)

selected which are thin enough not to interfere in the area of the spectrum being investigated. Polyethylene is excellent since it does not interfere with isocyanate, epoxy, or carbonyl group frequencies at 4.4, 10.8, or 5.8 microns respectively. The films are then pressed between very flat plates under a pressure that gives the desirable thickness and fulfills other conditions. Normally the base materials are prepolymers or have physical properties capable of maintaining the film. Following the pressing process, the film "sandwich" is cut to accommodate the instrument.

Note:

No further documentation is available. Specific questions, however, may be directed to:

Technology Utilization Officer
Manned Spacecraft Center, Code BM7
Houston, Texas 77058
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Patent status:

No patent action is contemplated by NASA.

Source: D. W. Houston and G. G. Garrard of
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